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Designing components of a sample system considering effect of web-based technologies on meaningful measurement and assessment practices

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Abstract

The changes taking place in measurement and assessment require using of assessment methods which can gain more clues about students' learning, at the same time inform them about their shortcomings and eliminate those shortcomings. While summative assessment methods enable giving grades reflecting students' performance, formative assessment methods give feedback to students and help them develop their learning. In parallel with such a change in measurement and assessment, alternative assessment methods are being used in addition to the traditional ones. The most important key to formative assessment method, which follows student learning and helps to meet their needs, is the open and detailed feedback itself. Formative and summative assessment methods, when used together, constitute complementary, meaningful and effective assessment practices. Educators prefer not using formative assessment method due to many reasons such as gradually increasing number of students, workload and its time consumption. Advanced assessment means are needed for teachers to save time during assessment of large number of students. At this point, used information web technology covers majority of activities such as comparing, analyzing, and transferring of examination grades, and thus helps students and staff for feedback, time saving, relieving administrative workload and developing assessment methods. Information Technologies must be employed in meaningful assessment practices for not only transforming traditional assessments into electronic format but also testing students' information and skills. In this study, web-based solutions are sought for problems arising from using of formative and summative assessment methods in traditional media. The system to be prepared must make it possible to use formative and summative assessment methods together for meaningful assessment. Particular requirements for such a system design are using questioning techniques, database management, file management and automation features in web-based media.

Keywords: Measurement-assessment, web based assessment, summative assessment, formative assessment;

1. Introduction

1.1. Changes in Measurement and Assessment in Education

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According to Constructivism, students must be provided with opportunities of multiple measurement and assessment. (Balcı and Sarı, 2005). Whereas teachers seek for the right answer for measuring students' learning in traditional classrooms, assessment of students is hand in hand with the process of teaching in constructivist classrooms. In the latter case, assessment of students is composed of students' works, portfolios and teachers' observing students during work (Brooks, and Brooks, 1999). A set of well-prepared measurement and assessment practices is needed for revealing what students understood and what they did not understand (Aydın and Çağıltay, 2007). Effects of assessment on learning are raises motivation for learning, students decide on what they learned, shows how students learn, helps students effectively use their learning (Gipps and James, 2006).

According to researches; challenges faced in measurement and assessment in traditional education are crowded classrooms, poor knowledge of measurement and assessment, instructors' being short of time for building an effective measurement and assessment, difficulty of preparing such tests and lack of measurement and assessment units in academic departments. Furthermore; teachers mostly prefer traditional methods in recognizing their students and determining their success level, and regard themselves proficient mostly in examinations called traditional methods (Callı et al., 2003) (Gelbal and Kelecioğlu, 2007).

1.2. Types of Assessment

Assessment is divided into two such as formative and summative assessment. Formative can be defined as assessment of learning. It gives necessary information for both teachers and students about the way students' learning continue (Ruhe and Zumbo, 2009). Students are provided feedback so as to support students' developing their own learning. On the other hand, summative assessment is an attempt to summarize learning activities undertaken by a student at a certain time.. Continuous assessment is the type of assessment which theoretically integrates summative and formative assessment. In practice, continuous assessment is done by means of summative assessments repeated with recording of grades, and provides little, or no, feedback for students (Kennedy, 2007) (Brualdi, 1998).

1.3. The Problem

Components of a sample web-based measurement and assessment system are designed considering the problems faced in realizing meaningful measurement and assessment practices and potential solutions to be proposed by web technologies.

1.4. Aim

A well-balanced integration of summative and formative assessment methods must be used for creating meaningful assessment activities in education. Solutions to be introduced by web-based media for problems to be faced upon implementing these assessment functions in traditional media are proposed. Particular emphasis is placed on designing a system which uses investigation techniques, database management, and file management and automation properties in a web-based media.

2. Studies Carried Out

2.1. Comparison of Summative and Formative Assessment Methods in terms of Features

Summative and formative assessment methods are compared from many aspects in Table 1.

Table 1. Comparison of summative and formative assessment methods

	Summative Assessment	Formative Assessment
Aim	It measures what a student knows at a specific time. It focuses on memorization and recalling skills. Exam grades do not indicate student development. It shows what a student achieved at the end of the course.	It provides necessary information about the way students' learning continues. It also gives information about what and how students understand.
Time of implementation	Done at the end of the curriculum.	Done throughout the curriculum.
Usage	More preferential.	Less preferential. Either they don't know the proper way of assessing students' performance or they are unwilling because of the previous unsuccessful trials. Requires a lot of time.
Instruments used	Multiple choice questions, true-false questions, matching questions, gap-filling (cloze test) questions, short-answered questions, long-answered questions	Performance assessment, Graded Scoring Scales (Rubric),Group/peer assessment, Self- assessment, outcome folder (Portfolio), Project, Concept maps, structured grid, Descriptive branched tree, Word association
Feedback	There is no or closed feedback.	There is open feedback, requires a lot of time. Grading is difficult. It takes a lot of time to create open (detailed) feedback.
Effect on learning	Measures memory information.	Provides in-depth learning.
Results	Missing parts are uttered and grade is given.	Missing parts are covered.

2.2. Role and Importance of Information and Communication Technologies (ICT) for Measurement and Assessment Practices

Computers are used for solving some challenges faced in education depending on the increase in the number of students. The contribution made by technology to instruction activities and assessment is gradually increasing.

Brown (1999) lists benefits of using information and communication technologies in assessment as follows.

- It automatically grades students' works and thus relieves teachers' workload,
- It provides more effective and detailed formative feedback for students than traditional assessment,
- It helps students be closer to computer-based learning environments and to gain assessment culture.

Computer-based assessment includes majority of the activities such as comparison, analysis and transfer of exam results. Computer-based assessment introduces both students and teachers to facilities like feedback, time saving, relief of administrative workload and development of assessment methods. It is not a solution to put traditional assessment results into electronic format for testing students' knowledge and skills. As a part of the balance between assessment methods regarding knowledge and skills to be checked, computer-based assessment is too important to be excluded from assessment practices. In particular, it allows provides opportunities for academic staff for monitoring, examining and arranging assessment strategies as a whole (Bull, 1999).

Iron (2008) suggests that there are many reasons for using ICT in formative assessment and formative feedback.

- It supports increasing number and change of various students, (Students have different backgrounds.)
- It solves the deteriorating problem of staff-student proportion,
- It provides more flexible and alternative environments for students, automatic responses for formative activities,
- It ensures acceleration of feedback (Allows quicker communication in automatic answering or overall feedback),
- It allows students to do online discussions in individual assessment.

Moreover; ICT mitigates workload of academic staff because it functions as an automatic teacher. It checks students' answers against predetermined mistakes, analyzes these answers and gives feedback for correcting those mistakes. Table 2 shows the effect of online (web-based) media on formative and summative assessment methods.

Table 2. Effect of Online Media on Formative and Summative Assessment Methods

Formative Assessment		Summative Assessment	
In traditional media	**Online**	**In traditional media**	**Online**
It is exhaustive and time-consuming to create exam documents.	Exam documents can be loaded online or can be created online.	It is exhaustive and time-consuming to create question bank, exams, answer key and the testing environment for students.	Question bank, exams, answer key and the testing environment can be prepared for students.
It is difficult and time-consuming to carry out descriptive branched tree, Structured Grid and Work Association tests with every single students in traditional classroom environment.	Branched tree, Structured Grid and Word Association tests can be implemented online by students in accordance with predetermined implementation guidelines.	Answers are checked one by one by teacher.	Answers can be checked automatically.
Every time feedback is written again.	Feedback library kept online and feedback previously used by teacher can be stored and recalled later.	Exam results are represented by reports or graphics after loading results manually or by means of computer.	Exam results can be represented by reports or graphics.
Students cannot see each others' exam papers and parents cannot see students' exam papers or feedback.	Students can see each others' exam papers and parents can see students' exam papers and feedback.	All records regarding the exam are stored in physical media.	All records regarding the exam can be stored online.

Researches demonstrate that an integration of formative and summative assessment methods is necessary for effective online assessment. Before, online assessment was monitored version of hard copy of existing assessment only. Online use of discussion and reflective learning diaries in forums changes traditional types of assessment. Despite talking and discussions as a long-lasting part of the learning process, computers' ability to record and store those talking and discussions allows including in formal assessment practices. The delay period in unsynchronized discussions allowing reflective thinking is a sign of in-depth learning approach, which is the aim of higher education (Underhill, 2006) (Dali, 2008). Advanced assessment tools are needed for teachers to save time in assessing large numbers of students (Costagliola and Fuccella, 2009).

2.3. Components and Features of a Sample Web-Based Effective Assessment System

A system allowing the use of both formative and summative assessment methods in web-based media must be devised for effective assessment. Main features and potential benefits of such a system are seen in Table 3.

Table 3. Features of the system

Feature	Potential benefit
Web-based media	Independence on time and place and quick access
Methods of investigation	Reporting against predetermined criteria
Database management	Question bank, answer bank and feedback library
File management	Loading multimedia file
Automation management	Access control, question-answer, automatic marking, giving feedback

The system is expected to introduce students and teachers to following potential benefits in a web-based media. For teachers; the ability to use traditional and alternative assessment methods, Creating question-answer bank and feedback library, The system's recognizing mistakes, Adding multimedia (sound, image, video) files to questions

and feedback, Reporting and recording assessment results of the system against certain criteria, Analyzing individual and collective assessment results, Undertaking individual assessment follow-up of students. For students; access to detailed assessment results and feedback, Existing in an assessment environment where they in cooperation with teacher and peers can cover missing parts of their learning.

3. Conclusion

Once meaningful assessment model as an integration of traditional and alternative assessment methods is online, it will be possible

- For students to take active role in assessment activities, to decrease teachers' workload and challenges in using assessment methods, to save time and encourage using of formative assessment methods,
- To store assessment records, question bank and answer bank in database, to do reporting on assessment records stored in the database against criteria by means of the investigative method, to keep feedback giving function in database records and to do it in a quick and easy way,
- For automation software to allow users (teachers and students) to control access, to automatically create assessment results and to give automatic feedback.

The system to be devised must be equipped appropriately to help teachers to relieve their increased workload and help them for individual follow up students in assessment depending on the increasing number of students. Similarly, teachers must be able to obtain detailed assessment clues from the measurement and assessment records kept in the database in accordance with required criteria, and report them as required by means of investigation techniques. Time and workload requirements for these transactions in traditional media will be saved thanks to this system to be devised in a web-based environment. Many controlling components to be used in the system infrastructure seem to bring more flexibility to the assessment practices.

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